FORECAST DIVISION.

Prof. E. B. GARRIOTT, in charge.

RIVERS AND FLOODS.

The floods that occurred during the year were discust in the Reviews for the appropriate months, and need no further mention here other than the simple statement that they were forecast with the usual timeliness and accuracy over all districts where river and flood service is maintained.

The total number of river forecasting districts has been increased from 47 to 48 by the division of the district of Charleston, S. C., and the assignment of the supervision of the Santee and Edisto watersheds to Columbia, S. C., which was established as a river district center on July 1, 1906. On the same date the supervision of the district of California was transferred from San Francisco to Sacramento, Cal. The total number of stations of observation remains practically the same as during the year 1905, altho quite a number of changes were made during the year. A detailed statement follows:

RIVER STATIONS ESTABLISHED.

Station.	*District.*
Birds Bridge, Tenn	Knoxville, Tenn.
Catawba, S. C	Columbia, S. C.
Denison, Tex	Shreveport, La.
Electra, Cal	Sacramento, Cal.
Firebaugh, Cal	Sacramento, Cal.
Fort Ripley, Minn	Minneapolis, Minn.
Jacksonville, Cal	Sacramento, Cal.
Jenny Lind, Cal	Sacramento, Cal.
Melones, Cal	Sacramento, Cal.
Merced Falls, Cal	Sacramento, Cal.
Merrill, Iowa	Sioux City, Iowa.
Monroeville, Cal	Sacramento, Cal.
Pearl River, La	Meridian, Miss.
Pollasky, Cal	Sacramento, Cal.
Prowers, Colo	Denver, Colo.
Rimini, S. C	Columbia, S. C.
St. John, Cal	Sacramento, Cal.
Salida, Colo	Denver, Colo.

River observations also began on July 1, 1906, at Reno, Nev., in the district of Sacramento, Cal.

The stations were changed from special rainfall to special river at the following places:

Station.	*District.*
Mendota, Va	Knoxville, Tenn.
Newport, Tenn	Knoxville, Tenn.
Pelzer, S. C	Columbia, S. C.
Santa Rosa, N. Mex	Denver, Colo.

At the following stations in the district of Sacramento, Cal., where occasional observations only were taken heretofore, regular daily observations will be taken for seven months of each year:

Colusa, Cal.	Lathrop, Cal.
Folsom City, Cal.	Marysville, Cal. (Yuba River.)
Kennett, Cal.	Oroville, Cal.
Knights Landing, Cal.	Riovista, Cal.

RAINFALL STATIONS ESTABLISHED.

Station.	*District.*
Boonton Dam, N. J. (Cooperative.)	Philadelphia, Pa.
Delta, Cal	Sacramento, Cal.
Downieville, Cal	Sacramento, Cal.
La Porte, Cal	Sacramento, Cal.
Marion, Ohio	Columbus, Ohio.
Prattville, Cal	Sacramento, Cal.
Stony Ford, Cal	Sacramento, Cal.
Weston, Colo	Denver, Colo.

The station at Vincennes, Ind., Cairo, Ill., district, was changed from a special river to a special rainfall station.

RIVER STATIONS DISCONTINUED.

Station.	*District.*
Brookville, Pa	Pittsburg, Pa.
Catlettsburg, Tenn	Knoxville, Tenn.
Coshocton, Ohio	Columbus, Ohio.
Glendive, Mont	Sioux City, Iowa.
Iowa City, Iowa	Keokuk, Iowa.
Musselshell, Mont	Sioux City, Iowa.
Springfield, Ohio	Columbus, Ohio.

RAINFALL STATIONS DISCONTINUED.

Station.	*District.*
Batesville, Miss	Vicksburg, Miss.
Black River Falls, Wis	La Crosse, Wis.
Buckingham, Va	Richmond, Va.
Catawba, N. C	Charleston, S. C.
Dyersburg, Tenn	Memphis, Tenn.
Fayetteville, Ark	Little Rock, Ark.
Gaffney, S. C	Charleston, S. C.
Glasgow, Va	Richmond, Va.
Greeneville, Tenn	Knoxville, Tenn.
Howardsville, Va	Richmond, Va.
Jackman, Me	Portland, Me.
Kenton, Ohio	Columbus, Ohio.
Marion, Kans	Fort Smith, Ark.
Oregon, Ark	Little Rock, Ark.
Peterson, Minn	La Crosse, Wis.
Tercio, Colo	Denver, Colo.
Thornton, N. Mex	Denver, Colo.
Williamsburg, Ky	Nashville, Tenn.

The highest and lowest stages for the year, together with the annual ranges at 256 selected stations, are shown in Table V.—*H. C. Frankenfield, Professor of Meteorology.*

GENERAL CLIMATIC CONDITIONS.

By Mr. P. C. DAY, Assistant Chief, Division of Meteorological Records.

PRESSURE.

The annual distribution of mean pressure during 1906 over the United States and Canada is graphically shown on Chart VI, and the average values and departures from the normal are shown for each station in Tables I and IV.

The normal annual distribution of atmospheric pressure shows the existence of two well-defined high areas—one over the Ohio Valley, east Gulf, and South Atlantic States, and extending eastward over the Atlantic, with the crest, 30.10 inches or above, east of the Bermudas; while the second high area covers the Pacific between the Hawaiian Islands and the coast of Oregon and northern California, extending eastward into northern California and central Oregon.

During 1906 high pressure covered the greater part of all districts east of the Mississippi Valley, except the Florida Peninsula and New England, and extended in a narrow strip westward over the lower Missouri Valley into the central Rocky Mountain and Plateau districts.

Pressure averaged unusually high over the eastern slope of the Rocky Mountains and in the upper Lake region and northward over the Province of Ontario, where the normal was exceeded from .05 to .07 inch.

In a narrow strip along the coast of southern California and over the greater part of northern California and the western portions of Oregon and Washington, also over the Florida Peninsula, the pressure averaged slightly below normal; otherwise over all districts of the United States and Canada the average for the year was above the normal.

TEMPERATURE.

The year was one of unusual warmth over nearly all districts.

Along the entire northern border from the lower Lakes westward to the Pacific the annual means averaged 2° or more above the normal, and across the border in Manitoba and surrounding districts the average for the year exceeded the normal from 3° to more than 5°.

In the southern portions of Georgia and Alabama and over the Florida Peninsula the temperature averaged slightly below normal, also over western Texas and the greater part of New Mexico, Arizona, and Utah.

The extremes of temperature for the year from all regular stations and from a limited number of cooperative stations in the United States and Canada are shown on Chart IX.

An examination of the chart shows that the extremes of temperature were, as a rule, well within the limits of former years.

Maximum temperatures of 100° or higher were recorded in the upper Missouri Valley, at scattered points in the Gulf States, in central and western Texas, over the southern portions of New Mexico and Arizona, and the central portions of California, Oregon, and Washington.

Minimum temperatures of 30° below zero or lower were confined to portions of northern New England, northern Minnesota, North Dakota, and to the elevated stations of the central Rocky Mountain district.

PRECIPITATION.

The annual precipitation for 1906 is shown on Chart IV. Over the districts east of the Rocky Mountains, lines have been drawn showing approximately the amounts of precipitation over the areas inclosed. Over the western Mountain and Pacific coast districts, on account of the diversified topography and the consequent variations in the annual fall, no attempt has been made to show the annual amounts by isohyetals, and figures representing the actual amounts have been entered at the respective points of observation.

The enormous variations possible in the amounts of fall at points in close proximity are shown on the above-mentioned chart. Over the southern flanks of the Appalachian Mountains, in western North Carolina, and northern Georgia, the precipitation ranged from 75 to nearly 130 inches, while on the opposite slopes scarcely one-half of those amounts was recorded.

Also near the coast of northern Oregon amounts as high as 140 inches fell on the western slopes of the Coast Range, at elevations not above 2500 feet, which were twice the amounts measured at the level of the sea.

The departure of the annual precipitation for 1906 from the normal is shown on Chart XI.

Lines showing the amounts of departure have been drawn where sufficient uniformity existed in the signs, otherwise figures representing the actual departures were entered.

The total precipitation for 1906 was below the normal along the Atlantic coast from Virginia to central Florida, and over the Gulf coast from western Florida to Texas. The deficiency on the immediate coast line was very marked, ranging from more than 12 inches at Hatteras to nearly 20 inches at New Orleans. Precipitation was also deficient over New England, New York, Pennsylvania, the Lake region, central Mississippi, and lower Missouri valleys, and over the north Pacific coast districts.

In marked contrast with the deficiency along the Atlantic and Gulf coasts, the amount of fall over the Appalachian Mountain region from Pennsylvania southward to the central parts of the east Gulf States, and in a narrow strip westward over Alabama, northern Mississippi, central Arkansas, and northern Texas, ranged from 5 to as much as 25 inches above the average.

Precipitation was also in excess over practically all the Great Plains district from central Texas to North Dakota, over the entire Rocky Mountain and Plateau districts, and the Pacific coast from central Oregon to southern California.

The annual fall was especially heavy over central and northern Texas and the central and western portions of Oklahoma, Kansas, and Nebraska, where amounts from 10 to 12 inches above the normal were recorded.

In the central Rocky Mountain States, northern New Mexico, Arizona, Nevada, and central and southern California, the excesses were generally large, altho at isolated points the amounts were less than the average.

The year was one with rainfall in general sufficient for all ordinary requirements, and generally well distributed thru the growing season. An unusual amount of cloudy weather was the rule in nearly all districts, and the relative amount of moisture was generally in excess of the average.

DISTANT EARTHQUAKES RECORDED AT THE WEATHER BUREAU DURING THE YEAR 1906.

By C. F. MARVIN, Professor of Meteorology. Dated March 6, 1907.

This summary gives details of the records of all the earthquakes recorded by the Bosch-Omori seismograph in Washington, D. C., during 1906. In all cases the origin of these disturbances was at least hundreds and in most instances many thousands of miles distant from Washington; in fact, this type of seismograph is adapted to record only the so-called distant earthquakes.

Thus far the Weather Bureau has not maintained seismographs at any station except at Washington, D. C., and no organized effort is made to collect seismic observations. It therefore results that in many cases the origin of the earthquakes recorded is not known and can not be identified, except of course in the few instances where the earthquakes were accompanied by great calamities and are consequently reported in the public press.

The Weather Bureau has maintained some form of seismograph in operation in Washington almost continuously since 1886, but during the earlier years the record is quite incomplete, owing to the imperfect character of the instruments employed and to gaps in the records resulting from the removals of the office of the Weather Bureau, and other causes.

As stated in the MONTHLY WEATHER REVIEW, Vol. XXXI, p. 125, one pendulum of the Bosch-Omori seismograph was installed first during February, 1903. In the early part of 1906 this pendulum was moved to more spacious quarters, where, together with its companion pendulum, it could be installed in a much better and more permanent fashion, and both components of horizontal motion have been recorded continuously since April 22, 1906. The reader is referred to the MONTHLY WEATHER REVIEW, Vol. XXXI, p. 271, and Vol. XXXIV, p. 212, for further particulars in regard to the instruments themselves.

The year 1906 has probably been as notable as any in history for the number and disastrous nature of the great earthquakes that occurred. It is certain that within recent years no similar loss of life and devastation of populous centers of civilization has been recorded. These facts do not in themselves, however, justify a conclusion that there has been a distinct increase in the annual number of earthquakes; it has simply happened that the origin of many of the great seismic disturbances has occurred within thickly populated districts. In this connection it is very important to bear in mind that the secondary effects of earthquakes, such as fire in the one case and great tidal waves in the other, are often immediate causes of vastly greater disasters than the earthquake itself.

On the morning of January 31, 1906, seventy-fifth meridian time, the greatest earthquake thus far recorded on the seismographs at the Weather Bureau occurred in Colombia, South America, and several of the submarine cables in the Caribbean Sea connecting Colombia with the West Indian Islands were severed. This disturbance appears to have been accompanied by a great tidal wave, as shown by some of the press dispatches.

At this date no great earthquake had occurred within the United States since the Charleston earthquake, and it would seem that the horrors of such great disasters were almost forgotten. At any rate, the press of the country contained only a few scanty notices of this severe South American disaster,